Claims 8, 9, 11, 45-52, 55, 62 and 67 have been found free of the cited references. Claims 1-7, 10, 12-14, 38-44, 53, 54, 56-61, 63-66 and 68 stand rejected. Applicants respectfully request reconsideration of the rejections based on the following comments.

Rejections Under 35 U.S.C. §112

The Examiner rejected claims 1, 5, 13-14, 45-47, 49-52, 54, 60-61, 64 and 66 under 35 U.S.C. §112, second paragraph as being indefinite. The Examiner has raised several specific issues that are discussed in the order presented.

First, the Examiner raised an issue with respect to the nozzle. Specifically, the Examiner asserted that the function of the nozzle is unclear. Applicants have amended claim 1 to clarify the relationship between reactant inlet of the nozzle and reactant stream. Thus, the issue is moot because of the specified relationship.

The Examiner asserted that claims 5, 13 and 14 were inconsistent with claim 1. Applicants respectfully maintain that these claims are clear and consistent. Claim 1 indicates that the apparatus comprises a nozzle and the nozzle comprises a reactant inlet. Since comprising is an open claim term, the apparatus can have more than one nozzle and the nozzle can have more than one reactant inlet. Thus, there is no inconsistency. While Applicants thank the Examiner for suggesting a reasonable claim amendment, the amendment is unnecessary for consistency.

With respect to claims 45-47 and 49-50, the Examiner suggested revised language. While Applicants maintain that the language was clear, Applicants have amended the claim as recommended by the Examiner to advance prosecution of the case. Applicants note that the use of the term step is not intended to invoke 35 U.S.C. § 112, paragraph 6 and that sufficient action is specified with respect to the step.

With respect to claims 51 and 52, the Examiner again suggested revised language. While Applicants maintain that the language was clear, Applicants have amended the claim as recommended by the Examiner to advance prosecution of the case. Applicants note that the use of the term step is not intended to invoke 35 U.S.C. § 112, paragraph 6 and that sufficient action is specified with respect to the step.

With respect to claim 54, the Examiner indicated that it was unclear if the reactants are within the same or different fluid stream. However, that is the intended scope of the claim. In other words, the first reactant and the second reactant can be in the same or different fluid streams. However, the reactants are sequentially present in time and produce materially different product compositions, as noted in the claim. Thus, Applicants believe that the claim is clear.

Find support in spec

With respect to claim 60, the Examiner asserted that the claim did not have any distinguishing characteristics from claim 58. With all due respect, Applicants maintain that reactants that are materially different encompass not only embodiments in which the reactants comprise different compounds but also reactants that react at different pressures, have different flow rates or the like. Please see, for example, the specification at page 20, lines 10-25 and page 20, line 30 to page 21, lines 3-9. Thus, Applicants maintain that claim 60 has characteristics that distinguish it from claim 58.

page 10 also

With respect to claims 61 and 66, the Examiner indicated that the claims were unclear with respect to the function of the nozzle. Consistent with the amendment of claim 1, Applicants have amended these claims to clarify the nature of the nozzle.

With respect to claim 64, the Examiner indicated that the function of the reaction chamber was unclear. Applicants have amended claim 64 for clarity.

With respect to claim 1, the Examiner indicated that the claim lacked essential steps with respect to injecting the reactants. In general, omitted steps are only those steps indicated in the specification to be essential. See MPEP 2164.08(c). In the present case, Applicants believe that the clarification discussed above with respect to claim 1 clarifies all of the relevant issues with respect to this claim. In particular, Applicants do not believe that claim 1 has any omitted essential steps.

With respect to claim 52, the Examiner indicated that there was insufficient antecedent basis for the phrase "after removing products from the collectors." However, the clause referred to by the Examiner does not require an antecedent basis as written. Therefore, Applicants maintain that the claim is clear.

In view of the above clarifying amendments and comments, the claims are clear. Applicants respectfully request withdrawal of the rejection of claims 1, 5, 13-14, 45-47, 49-52, 54, 60-61, 64 and 66 under 35 U.S.C. §112, second paragraph as being indefinite.

Rejections Over Marsh et al.

The Examiner rejected claims 38, 53, 54, 56-60, 63-65 and 68 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent 4,649,037 to Marsh et al. (the Marsh patent). The Examiner cited the Marsh patent for disclosing a method for forming inorganic metal oxides by spray drying. The Examiner summarized the particular structure disclosed in the Marsh patent. The Examiner noted that the Marsh patent failed to disclose a plurality of collectors, but that it would be obvious to a person of ordinary skill in the art to use different collectors to collect different products. Applicants believe that there has been a misunderstanding with respect to certain claims that do not recite a plurality of collectors. Furthermore, the remaining claims include features not within the Marsh patent that were not commented on by the Examiner. Thus, the Examiner has failed to assert prima facie obviousness of Applicants' claimed invention over the Marsh patent. Applicants respectfully request reconsideration of the rejection based on the further following comments that elaborate on these issues.

with respect to claim 38 - a single collector is present

With respect to claims 38, 53, 54, 56 and 57, Applicants believe that there has been a misunderstanding. These claims are directed to "a mixture of compositions" within a **single** collector. Thus, the Examiner's statement that "it would have been obvious to one of ordinary skill in the art to recognize that in varying the reactants of the system different collectors or containers would be necessary to collect the different products from outlet 20 of the system in order to avoid mixing the products or cross contamination" is not on point. Thus, the Examiner has failed to assert a case for prima facie obviousness of these claims.

With respect to claims 58-60 and 63, Applicants' claimed invention indicates that the apparatus used to practice the claimed invention comprises a first quantity of fluid reactants and a second quantity of fluid reactants. Applicants have amended claim 58 to clarify that the second quantity of fluid reactants are different from the first quantity of fluid reactants. In contrast, the Marsh patent describes a single feed 1 connected to their drying chamber 9. The

Marsh patent does not disclose or suggest connection of a plurality of feeds for selective introduction of reactants into the drying chamber.

With respect to claims 64, 65 and 68, Applicants' claimed invention specifies that "the reaction chamber remains isolated from the ambient environment continuously from the reacting of the first quantity of reactants and through the reacting of the second quantity of reactants." Even assuming arguendo that using a device with a plurality of collectors would be obvious to a person of ordinary skill, the Examiner has not provided a motivation for or basis for the construction of an apparatus in the cited references that would allow switching between containers while maintaining the isolation from the ambient environment. If the Examiner is relying on personal knowledge to assert this particular reconstruction of the apparatus in the Marsh patent, Applicants respectfully request further explanation of the basis of this significant reconstruction to produce Applicants' claimed structure. 37 C.F.R. 1.104(d)(2). Applicants strenuously maintain that the Examiner has failed to assert prima facie obviousness of these claims, and that only hindsight based on Applicants' disclosure is the only basis of record to justify a significant reconstruction of the Marsh apparatus to form an apparatus with a plurality of collectors that can be separately used without exposing the reactor to the ambient environment.

Since the Examiner has failed to establish prima facie obviousness of Applicants' claimed invention over the Marsh patent, Applicants respectfully request withdrawal of the rejection of claims 38, 53, 54, 56-60, 63-65 and 68 under 35 U.S.C. § 103(a) as being obvious over the Marsh patent.

Rejections Over Marsh et al. and Acosta et al.

The Examiner rejected claims 1-7, 10, 12-14, 39-44, 61 and 66 under 35 U.S.C. § 103(a) as being unpatentable over the Marsh patent as applied to claims 38, 53, 54, 56 and 57 further in view of U.S. Patent 6,254,826 to Acosta et al. (the Acosta patent). The examiner noted that the Marsh patent does not disclose one or more movable nozzles that may comprise a plurality of reactant inlets. The Examiner cited the Acosta patent for disclosing a multiple conduit (inlets and nozzles) substance transfer device and a substance transfer device positioning structure. Applicants assert that the Examiner has failed to assert a reasonable basis for

motivating the combination and that the teachings of the references do not provide a reasonable basis for combining the disparate structures without non-obvious reconstruction of the components to form Applicants' claimed invention. Therefore, the Examiner has failed to establish prima facie obviousness. Applicants respectfully request reconsideration of the rejections based on the following comments.

With respect to claims 1-7, 10, 12-14 and 39-44, the Acosta patent does not teach or suggest performing a reaction within a fluid stream. The Acosta patent is directed to an apparatus for performing "biological assays." See, for example, the abstract, field of the invention and the background. To accomplish the assays, the apparatus directs solutions to a receptacle 262 using pipette tips. In contrast, the Marsh patent is directed to the performance of spray drying to form inorganic oxides. The inorganic oxides are directed to collectors for harvesting.

The Examiner asserts that the motivation to combine the disclosures in the Marsh patent and the multiple collectors in the Acosta patent is the description in the Marsh patent of producing product particles with different properties at different times. However, the Marsh patent and the Acosta patent are directed to very different ends. The Marsh patent describes spray drying to form inorganic particles for harvesting, and the Acosta patent describes biological assays. While Applicants' invention may or may not involve the harvesting of compounds and may or may not involve inorganic materials or organic materials, the cited references have limited disclosures **that do not motivate their combination** since they are directed to very different purposes. In particular, the Marsh patent does not disclose any advantage that could be gained from the use of multiple collectors since the bag collector 19 can collect product in continuous operation through outlet 20. Thus, the Marsh patent suggests that no advantage would be gained by using multiple collectors in parallel for the harvesting of particles.

Furthermore, the combination of the teachings of the Marsh patent and the Acosta patent does not lead to Applicants' claimed invention without significant inventive redesign. While the Examiner effortlessly suggests using the multiple collectors of the Acosta patent in the Marsh apparatus, the individual designs of the apparatuses are dramatically different. The Marsh apparatus is designed to produce product in continuous production. See, for example, Fig. 1,

column 3, lines 3-5 and column 7, lines 11-61. In contrast, the Acosta patent teaches a system that performs batch operations in individual receptacles, not reactions within a flow. There is no suggestion in the references themselves on how to merge these disparate structures into a uniform structure without hindsight based on Applicants' own disclosure. Furthermore, the substitution of the batch structure of the movable nozzles of the Acosta patent into the Marsh device is contrary to the intended purpose of the Marsh device to produce and collect quantities of powders. See, for example, the abstract of the Marsh patent. Thus, the combined disclosures do not render Applicants' claimed invention obvious.

Claim 61 depends from claim 58. As noted above, the Marsh patent does not teach or suggest connection of a plurality of feeds for selective introduction of reactants into the drying chamber. Again, there is no motivation to combine the disparate structures of the Marsh patent and the Acosta patent without hindsight based on Applicants' disclosure. Furthermore, the references themselves do not teach or suggest how to modify their respective structures to form Applicants' claimed invention absent hindsight based on Applicants' own disclosure. Thus, the combined disclosures of the Marsh patent and the Acosta patent do not render claim 61 obvious.

Claim 66 depends from claim 64. As noted above, the Marsh patent does not teach or suggest switching between different collects while maintaining the reaction system isolated from the ambient environment. The Acosta patent does not teach or suggest performing operations isolated from the ambient environment. Therefore, the Acosta patent does not make up for the deficiencies of the Marsh patent. The cited references alone or together do not teach or suggest the use of multiple collectors that can be used sequentially while maintaining the system isolated from the ambient environment. Therefore, the combined disclosures of the cited references do not render the claimed invention obvious.

Since the combined teachings of the Marsh patent and the Acosta patent do not render Applicants' invention prima facie obvious, Applicants respectfully request withdrawal of the rejection of claims 1-7, 10, 12-14, 39-44, 61 and 66 under 35 U.S.C. § 103(a) as being unpatentable over the Marsh patent as applied to claims 38, 53, 54, 56 and 57 further in view of the Acosta patent.

CONCLUSIONS

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,

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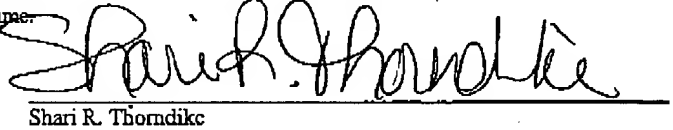

November 11, 2002
Date

Shari R. Thorndike

Application No. 09/557,696

ATTACHMENT
MARKED-UP AMENDMENT

Specification As Amended

At page 40, lines 13-29, the paragraph has been amended as follows:

The addition of chemical compositions to the synthesized powders can be combined with a heating step to facilitate the production of new materials. The additional materials can be applied as solutions and/or as powders. For example, silver compounds as powders or as a solution can be added to metal oxide particles, such as vanadium oxide particles. Subsequent heating as described above can result in the production of crystalline silver metal oxide particles, for example silver vanadium oxide particles. During the heating step, any solvent generally is evaporated. The incorporation of silver from a silver salt into vanadium oxide nanoparticles in a heat treatment process is described in copending and commonly assigned U.S. Patent Application Serial No. 09/311,506, now U.S. Patent 6,394,494, entitled "Metal Vanadium Oxide Particles," incorporated herein by reference.

At page 45, lines 11-29, the paragraph has been amended as follows:

The production of silicon oxide nanoparticles is described in copending and commonly assigned U.S. Patent Application Serial Number 09/085,514 to Kumar et al., entitled "Silicon Oxide Particles," incorporated herein by reference. This patent application describes the production of amorphous SiO_2. The production of titanium oxide nanoparticles and crystalline silicon dioxide nanoparticles is described in copending and commonly assigned, U.S. Patent Application Serial Number 09/123,255 now U.S. Patent 6,387,531 to Bi et al., entitled "Metal (Silicon) Oxide/Carbon Composites," incorporated herein by reference. In particular, this application describes the production of anatase and rutile TiO_2. The production of aluminum oxide nanoparticles is described in copending and commonly assigned, U.S. Patent Application Serial Number 09/136,483 to Kumar et al., entitled "Aluminum Oxide Particles," incorporated herein by reference. In particular, this application disclosed the production of γ-Al_2O_3.

At page 46, lines 7-20, the paragraph has been amended as follows:

The production of iron, iron oxide and iron carbide is described in a publication by Bi et al., entitled "Nanocrystalline α-Fe, Fe_3C, and Fe_7C_3 produced by CO_2 laser pyrolysis," J. Mater. Res. Vol. 8, No. 7 1666-1674 (July 1993), incorporated herein by reference. The production of nanoparticles of silver metal is described in copending and commonly assigned U.S. Patent Application Serial Number 09/311,506, now U.S. Patent 6,394,494 to Reitz et al., entitled "Metal Vanadium Oxide Particles," incorporated herein by reference. Nanoscale carbon particles produced by laser pyrolysis is described in a reference by Bi et al., entitled "Nanoscale carbon blacks produced by CO_2 laser pyrolysis," J. Mater. Res. Vol. 10, No. 11, 2875-2884 (Nov. 1995), incorporated herein by reference.

At page 47, lines 3-20, the paragraph has been amended as follows:

The production of ternary nanoparticles of aluminum silicate and aluminum titanate can be performed by laser pyrolysis following procedures similar to the production of silver vanadium oxide nanoparticles described in copending and commonly assigned U.S. Patent Application Serial Number 09/311,506, now U.S. Patent 6,394,494 to Reitz et al., entitled "Metal Vanadium Oxide Particles," incorporated herein by reference. Suitable precursors for the production of aluminum silicate include, for vapor delivery, a mixture of aluminum chloride ($AlCl_3$) and silicon tetrachloride ($SiCl_4$) and, for aerosol delivery, a mixture of tetra(N-butoxy) silane and aluminum isopropoxide ($Al(OCH(CH_3)_2)_3$). Similarly, suitable precursors for the production of aluminum titanate include, for aerosol delivery, a mixture of aluminum nitrate ($Al(NO_3)_3$) and titanium dioxide (TiO_2) powder dissolved in sulfuric acid or a mixture of aluminum isopropoxide and titanium isopropoxide ($Ti(OCH(CH_3)_2)_4$).

Claims As Amended

1. (Three Times Amended) A method for obtaining a plurality of quantities of compositions with an apparatus comprising a plurality of collectors and a nozzle comprising a reactant inlet, the method comprising:

reacting a first quantity of fluid reactants within a fluid stream at least a portion of which is from the reactant inlet to form a first quantity of product composition;

collecting the first quantity of product composition from the fluid stream using a first collector;

moving the nozzle relative to the first collector and second collector following completion of the collection of the first quantity of product composition;

following completion of the collection of the first quantity of product composition, reacting a second quantity of fluid reactants within the fluid stream at least a portion of which is from the reactant inlet to form a second quantity of product composition, the second quantity of product composition being materially different from the first quantity of product composition; and

collecting the second quantity of product composition from the fluid stream using a second collector.

38. (Amended) A method for producing a mixture of compositions, the method comprising:

reacting a first quantity of fluid reactants to form a first quantity of product composition;

collecting the first quantity of product composition using a collector;

following completion of the collection of the first quantity of product composition, reacting a second quantity of fluid reactants to form a second quantity of product composition, the second quantity of product composition being materially different from the first quantity of product composition; and

collecting the second quantity of product composition using the collector.

45. (Amended) The method of claim 12 wherein the step of evaluating the properties comprises evaluating the crystal structure by x-ray diffraction.

46. (Amended) The method of claim 12 wherein the step of evaluating the properties comprises evaluating particle size using dynamic light scattering.

47. (Amended) The method of claim 12 wherein the step of evaluating the properties comprises evaluation of the optical properties.

49. (Amended) The method of claim 12 wherein the step of evaluating the properties comprises measurement of the electroactive properties.

50. (Amended) The method of claim 12 wherein the step of evaluating the properties comprises measurement of the electrical properties or magnetic properties.

51. (Amended) The method of claim 12 wherein the step of evaluating the properties is performed without removing the products from the collectors.

52. (Amended) The method of claim 12 wherein the step of evaluating the properties is performed after removing the products from the collectors.

58. (Amended) A method for obtaining a plurality of quantities of compositions with an apparatus comprising a plurality of collectors and a reactant delivery system comprising a first quantity of fluid reactants and a second quantity of fluid reactants being different from the first quantity of fluid reactants, the method comprising:

reacting the first quantity of fluid reactants within a fluid stream to form a first quantity of product composition;

collecting the first quantity of product composition from the fluid stream using a first collector;

following completion of the collection of the first quantity of product composition, reacting the second quantity of fluid reactants within the fluid stream to form a second quantity of product composition, the second quantity of product composition being materially different from the first quantity of product composition, wherein the second quantity of fluid reactant is different from the first quantity of fluid reactants; and

collecting the second quantity of product composition from the fluid stream using a second collector.

61. (Amended) The method of claim 58 wherein the apparatus comprises a nozzle comprising a reactant inlet that moves relative to the plurality of collectors and wherein the nozzle is moved relative to the first collector and second collector following completion of the collection of the first quantity of product composition, at least a portion of the first quantity of fluid reactants being from the reactant inlet and at least a portion of the second quantity of second fluid reactants being from the reactant inlet.

64. (Amended) A method for obtaining a plurality of quantities of compositions with an apparatus comprising a plurality of collectors and a reaction chamber isolated from the ambient environment, the method comprising:

reacting in the reaction chamber a first quantity of fluid reactants within a fluid stream to form a first quantity of product composition;

collecting the first quantity of product composition from the fluid stream using a first collector;

following completion of the collection of the first quantity of product composition, reacting in the reaction chamber a second quantity of fluid reactants within the fluid stream to form a second quantity of product composition, the second quantity of product composition being materially different from the first quantity of product composition, wherein at least one reaction condition during the formation of the second quantity of product compositions is different from the reaction condition during the formation of the first

quantity of product compositions and wherein the reaction chamber remains isolated from the ambient environment continuously from the reacting of the first quantity of reactants and through the reacting of the second quantity of reactants; and

collecting the second quantity of product composition from the fluid stream using a second collector.

66. (Amended) The method of claim 64 wherein the apparatus comprises a nozzle comprising a reactant inlet that moves relative to the plurality of collectors and wherein the nozzle is moved relative to the first collector and second collector following completion of the collection of the first quantity of product composition, at least a portion of the first quantity of fluid reactants being from the reactant inlet and at least a portion of the second quantity of second fluid reactants being from the reactant inlet.